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Abstract:A 42 GHz, 200 kW continuous wave (CW) gyrotron, operating at TE <inf>03</inf> mode is under development for the electron cyclotron resonance plasma heating of the Indian TOKAMAK system. The gyrotron is made up of an undepressed collector. The undepressed collector is simple to design and cost effective. In this paper, a detailed design study of the undepressed collector for the 42 GHz gyrotron is presented. The EGUN code is used to analyze the spent electron beam trajectory for the maximum spread to reduce the power loading on the collector surface. To achieve wall loading ≤1 kW/cm², a collector with a length of 800 mm and a radius of 42.5 mm is designed. The design also includes the three magnet systems around the collector for maximum and uniform beam spread. The thermal and the structural analyses are done using the ANSYS code to optimize the collector structure and dimensions with tolerance. © 2011 Springer Science+Business Media, LLC.